UNEP

OUR PLANET

The magazine of the United Nations Environment Programme - May 2008

KICK THE HABIT

Towards a low carbon economy

OUR PLANET

Our Planet is published by the United Nations Environment Programme (UNEP).

Director of Publication:
Editor:
Coordinator:
Assistant Coordinator:
Special Contributor:
Distribution Manager:
Design:
Produced by:

Printed by:
Distributed by:

New Zealand's Prime Minister **Helen Clark** ... reflects on the environmental challenges of our era ahead of World Environment Day.

Angela Merkel, Chancellor of the Federal Republic of Germany ... talks to *Our Planet* about the prospects for a new global agreement on combating climate change.

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Dr. Wan Gang, Minister of Science and Technology of the People's Republic of China ... describes important programmes for helping the world to navigate new technological waves of climate change.

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Thorunn Sveinbjarnardóttir, Minister for the Environment, Iceland ... describes the decarbonisation of her country and calls for a drive to develop climate-friendly technologies.

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Dr. Tewolde Berhan Gebre Egziabher, Director General of the Environmental Protection Authority, Ethiopia ... argues for development and developing countries to gain in cutting carbon emissions. It's not too late, he says.

Ray C. Anderson, Founder and Chairman of Interface Inc ... describes how one formerly oil-intensive company is set to achieve zero impact on the environment by 2020 by harnessing the power of the possible.

mission zero - page 16

Vinod Khosla, Founder of Khosla Ventures ... explains how the power of ideas, and entrepreneurship will solve the world's energy woes, while tackling climate change.

Rob Fyfe, Chief Executive Officer of Air New Zealand ... describes first steps in cutting the carbon emitted by airlines.

green sky thinking - page 22

Meenakshi Raman, Chief Executive of the Earth Intelligence ... argues for fundamental changes, particularly in developed countries, to stabilise the climate.

living simply - page 24

Rock star KT Tunstall ... shares her unorthodox advice on reducing your carbon footprint.

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eflections

y Achim Steiner
N Under-Secretary-General and
xecutive Director, UNEP

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people

Climate Change: A Global Issue

Message from New Zealand's Prime Minister Rt Hon Helen Clark

unique
challenge
Angela Merkel talks to *Our Planet*

verbatim

numbers

percentage of total global of carbon dioxide emissions produced by shipping — *Institute for Physics and Atmosphere in Wessling, Germany*

tonnes of CO_2 that the average UK household could save annually by making its home energy-efficient — *World Business Council for Sustainable Development*

tons of standard coal used for every 10,000 yuan of GDP in China in 2006. Energy consumption in 1980 was 3.39 tons per 10,000 yuan of GDP — *'Kick the habit: the UN guide to climate neutrality'*

percentage growth in the Earth's population since 1987. Global economic output has risen by 76 per cent over the same period — *'Kick the habit: the UN guide to climate neutrality'*

number of years during which coal will be available at current production levels. This compares to 41 years for oil and 65 years for gas — *World Coal Institute*

percentage of world trade which is carried by sea — *Institute for Physics and Atmosphere in Wessling, Germany*

percentage of global energy used by heating, cooling and lighting homes and using household appliances — *World Business Council for Sustainable Development*

barrels of oil China will need every day by 2031 if it uses oil at the rate that Americans do today. Current total world production is about 85 million barrels daily — *Earth Policy Institute*

percentage of global energy supply consumed by personal and commercial transport. 80 per cent of this comes from fossil fuels — *'Kick the habit: the UN guide to climate neutrality'*

rise of atmospheric CO_2 concentration in parts per million (ppm) over the last two centuries of human industry. Over the previous 610,000 years, long-term change in atmospheric CO_2 concentration was just 22 ppm — *Nature Geoscience*

books

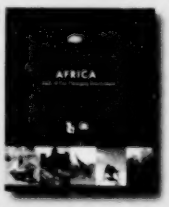
Kick the habit: A UN guide to Climate Neutrality

This new UNEP book — launched on World Environment Day — shows how various levels of society can work towards climate neutrality. Written and reviewed by experts from many disciplines and various countries, the book is aimed at a broad audience, with solutions for individuals, small and large businesses, NGOs, international organizations, cities and countries. With case studies, illustrations, maps and graphics the book is intended as a valuable reference publication and entry point for anyone wanting to find out more about going climate neutral. A web version of the book will be launched following the print publication, helping to make this guide easily accessible as well as climate neutral.

Ting and the possible futures

This children's book, released for World Environment Day, brings to life the frightening but real possibilities of an out-of-control climate crisis — and the positive and achievable steps we can all take to save our climate. Ting and her friends travel to two different futures using a time machine. The first future Ting explores is one of drought, submerged coastal cities, and refugee shantytowns. In the second possible future, Ting sees a huge change in attitude as well as landscape because people acted in time and averted the worst effects of climate change. Ting sees creative sources of energy, the power of planting trees and urban gardens, and a transport system that relies on trains, trams, bikes, and walking.

Africa: Atlas of our changing environment



This 350-page atlas chronicles the dramatic environmental change taking place in each of Africa's 53 countries. Through a combination of ground photographs, current and historical satellite images, and narrative based on extensive scientific evidence, it illustrates the ways in which human activities impact Africa's environment. Side-by-side displays of before-and-after satellite images show at a single glance the changes wrought over time — including forest loss, urban growth, shrinking lakes and receding glaciers. The Atlas documents the changes and their causes to communicate the urgency of addressing them to policy makers and the general public.

Green breakthroughs

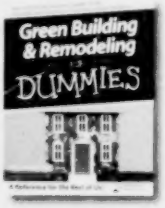
This booklet, distributed to Ministers and senior officials at UNEP's Governing Council in February 2008, describes effective policies and laws that have been used to solve environmental problems. Regional and country success stories from around the world include energy and climate change solutions, the management of various kinds of wastes, the preservation and restoration of ecosystems, and the sustainable use of biodiversity and fisheries. The book shows how innovative policies and laws can reduce damage, increase efficiency and sustainability, and ensure environmental, social and financial benefits.

www.unep.org/publications

How to Go Carbon Neutral: A Practical Guide to Treading More Lightly upon the Earth

Mark Brassington (Oxford: How To Books, May 2008) This book offers instructions on how to change your lifestyle to become more carbon neutral, based on the principle that every step matters — from low-energy light bulbs to electric cars and a 50KW wind turbine. The author has doggedly set about trying to make his own house carbon neutral, searching through many sources, including books and websites. Having tried a variety of approaches, including the more unusual ones such as putting vegetable oil in his car, and he uses this broad knowledge as the basis for the advice in his book. The chapters include sections on heating, electricity, water, transport, food and shopping.

Green Building & Remodeling For Dummies



Eric Corey Freed (For Dummies, December 2007) This recent addition to the For Dummies series is a step-by-step guide to green building techniques. Over its 361 pages, the book introduces every facet of green building and renovating, from selecting materials to reducing energy and water use. It includes sections on the lifecycle of building materials, choosing green building methods and sustainable systems, as well as information on asbestos and lead-paint hazards and on how to avoid costly mistakes. Finally, it lists 10 green things to do on every construction project and 10 things you can do right away in your home in order to go green. To quote the book's back cover, this is "The fun and easy way to plan and build your dream green home".

Sustaining Life: How Human Health Depends on Biodiversity

Eric Chivian and Aaron Bernstein (Oxford University Press, June 2008)

The Earth's biodiversity is disappearing at an alarming rate. While many books have focused on the expected ecological or economic consequences of this loss, Sustaining Life is the first to examine the full range of potential threats that diminishing biodiversity poses to human health. Edited and written by two Harvard Medical School physicians, with contributions and reviews by more than 100 leading scientists, the book presents a sobering view of how human medicines, biomedical research, the emergence and spread of infectious diseases, and the production of food, both on land and in the oceans, depend on biodiversity. Sustaining Life was supported by UNEP, the World Conservation Union, the UN Development Programme and the Convention on Biological Diversity.

Earth: The Sequel: The Race to Reinvent Energy and Stop Global Warming

Fred Krupp, Miriam Horn (W. W. Norton, March 2008) Fred Krupp, the President of the Environmental Defense Fund, and journalist Miriam Horn, explore breakthroughs in solar, wind and biomass technologies in the fight against climate change. The book offers a business-centred prescription for alleviating climate change, coupling the market force of capitalism with technological innovation and entrepreneurial inventiveness. The authors argue in favour of strict federal carbon caps, which would induce innovators to explore new ways to control carbon dioxide emissions. The book notes the global and historical successes of cap and trade mechanisms, such as the Clean Air Act of 1990 — designed specifically to control sulphur dioxide (which causes acid rain), the Clean Air Act cut emissions 30 per cent more than the law required by providing coal plant operators with a financial incentive to modernize. The book balances science with profiles of individuals who are blending business and science in an attempt to save the planet.

crucial science

by Wan Gang

Global climate change is not just an environmental issue but, even more importantly, a development one. As a developing country and a signatory to the UN Framework Convention on Climate Change, China has always taken an active part in the global campaign on climate protection, undertaken international obligations within its capacity and contributed to global environmental protection.

Protecting the environment is a time-honoured tradition, deeply embedded in Chinese culture. The philosophy of "harmony between man and nature" has guided the life and work of its people for thousands of years. The advanced agricultural civilization of ancient China testifies to the important achievements the nation has made in learning about the climate and properly using and preserving the environment.

China has always placed climate change and other environmental issues high on its agenda. It established a National Coordination Committee on Climate Change as early as 1990, participated in a series of domestic and international campaigns, and made important contributions to global environmental protection. Since 2006, it has stepped up national efforts as a key component of the Outline of the National Medium and Long-term Programme for Science and Technology Development, the Eleventh Five-Year Plan and Medium and Long-term Plan for Forestry Development published in 2007 set the target of raising forest coverage to 20 per cent and 23 per cent respectively by 2010 and 2020. In June 2007, the National Leading Group on Climate Change, headed by Premier Wen Jiabao, was established. China's National Climate Change Programme was also promulgated, setting the goal of reducing energy consumption per unit of GDP by 20 per cent from its 2005 level by 2010, and proposing a series of national campaigns to deal with climate change. Other efforts include publishing the National Assessment Report on Climate Change and the Handbook on Nationwide Energy Conservation and Emissions Reduction, and launching the Public Campaign on Energy Conservation and Emissions Reduction. According to incomplete statistics, China has already introduced more than 60 regulations in this area.

Scientific advance is essential for protecting the climate and tackling climate change. China is introducing policies that set directions and programmes that turn words into deeds. The Law on Science and Technology Progress, enforced in 1993, legally guarantees the implementation of climate change policies. The Ministry of Science and Technology promulgated the Outline of Science and Technology Programmes for Social Development, the Outline of Science and Technology for Sustainable Development and the Science and Technology Actions on Climate Change in 1995, 2002 and 2007 respectively, identifying the goals, tasks and supportive measures of China's efforts to tackle climate change, save energy and reduce emissions.

Since 1991, China has been fully upgrading its ability to do basic climate-change research and run research and development programmes on energy conservation and emissions reduction — such as the National Key Science and Technology Programme, the High-tech Research and Development Programme, the Basic Research Programme, the Innovation Project of the Chinese Academy of Sciences and National Natural Science Foundation projects. Policy incentives have been introduced to engage the public and the business community in nearly 1,000 climate change projects (covering energy conservation, emissions reduction, low carbon economy and renewable energy), with a total research and development investment of over RMB 20 billion. The country has taken an active part in global

research on climate change with some 100 countries, participated in major international research programmes, and hosted the Monsoon Asia Regional Integrated Study.

China has already established an observation system covering a wide range of subjects such as meteorology, hydrology, disasters and ecology, and now has 18 state key laboratories, hundreds of research teams and nearly 10,000 professionals studying global climate change. It has developed its physical climate system and regional climate pattern and participated in the international programme on climate pattern comparison. Significant progress has been made in research on high resolution climate series (loess, ice core and literature), the mechanism of monsoon change in East Asia, extreme climate events, and carbon estimation of the eco-system. China also contributed to the IPCC evaluation report on climate change. Backed by the Government, Chinese research institutes and enterprises have developed technologies and techniques that save energy and use such renewable sources as biomass. These achievements have been widely applied in industrial production.

The country has substantially curbed its greenhouse gas emissions by increasing energy efficiency and developing renewable energies. It is now the world's biggest producer of photovoltaic cells. It also has leading technologies for clean coal power generation which greatly facilitate energy conservation and emissions reduction.

Between 1991 and 2005, China saved 800 million tons of coal equivalent — equal to reducing CO_2 emissions by 1.6 billion tons. By the end of the period, renewable energies accounted for 7.5 per cent of total energy consumption, equivalent to cutting another 380 million tons of CO_2. Between 1980 and 2005, net CO_2 absorption through afforestation amounted to 3.05 billion tons, with another 1.62 billion tons absorbed through enhanced forest management. The Government has approved more than 1,000 Clean Development Mechanism (CDM) projects, accepted by the CDM Executive Board, achieving over 100 million tons of certified emission reductions a year. Since the turn of the millennium, it has been committed to developing and applying technologies for clean energy, energy conservation and emissions reduction while sustaining its economic boom — as well as to exploring a development path that balances economic growth with resource and environmental conservation.

China is to implement the National Climate Change Programme, based on science and technology, in pursuit of its scientific outlook on development. It will improve its industrial structure, energy mix and efficiency, and promote renewable energy, afforestation and family planning. The aim is to build a resource-conserving and environment-friendly society and enhance the capacity to mitigate and adapt to climate change.

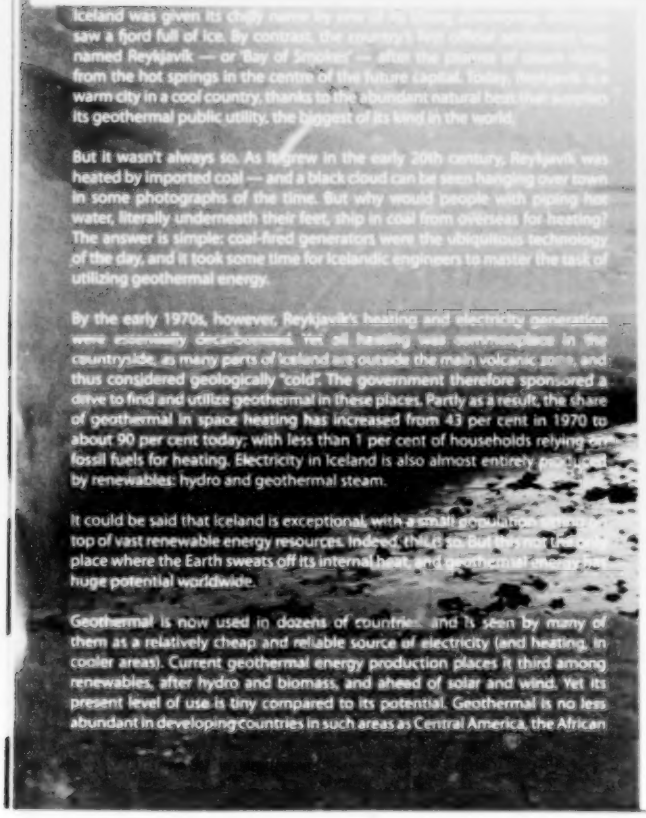
China is fully aware of the crucial role of science and technology in dealing with climate change, and will inject more funds into scientific research projects, technology development programmes and capacity-building efforts in this area. It will continue to improve its climate change monitoring network, establish more state key laboratories, and launch science and technology programmes to support research on Asia's monsoon system, typical regional climate change, the impact of climate change, adaptation and mitigation, renewable energy technologies, and low-carbon economy strategy, among others. The goal is to provide science and technology support for protecting the global climate and tackling climate change.

From now to 2009 will be a crucial period for global negotiations on establishing an international system for climate protection, and will call for the concerted efforts of all countries. When it comes to climate change, helping others is helping oneself. Only cooperation can bring mutual benefits and win-win outcomes. The Bali Roadmap, concluded at the end of 2007, embodies the wisdom and expectations of people across the world, and should be fully respected and implemented.

Developed countries should continue to take the lead in honouring their obligations to substantively reduce greenhouse gas emissions, and are encouraged to transfer technologies and provide financial support to developing countries' capacity building in dealing with climate change. Developing countries should take corresponding measures and contribute to global environmental protection efforts in the light of their own conditions. Developed and developing countries should have more practical cooperation and concrete actions, and less disputes and empty talks. Only with mutual trust can we have harmonious and close cooperation on protecting the global climate. Only in this way can human beings triumph over the ecological threat of climate change. We look forward to working with the rest of the world to build a new future.

cooling with heating

by Thórunn Sveinbjarnardóttir



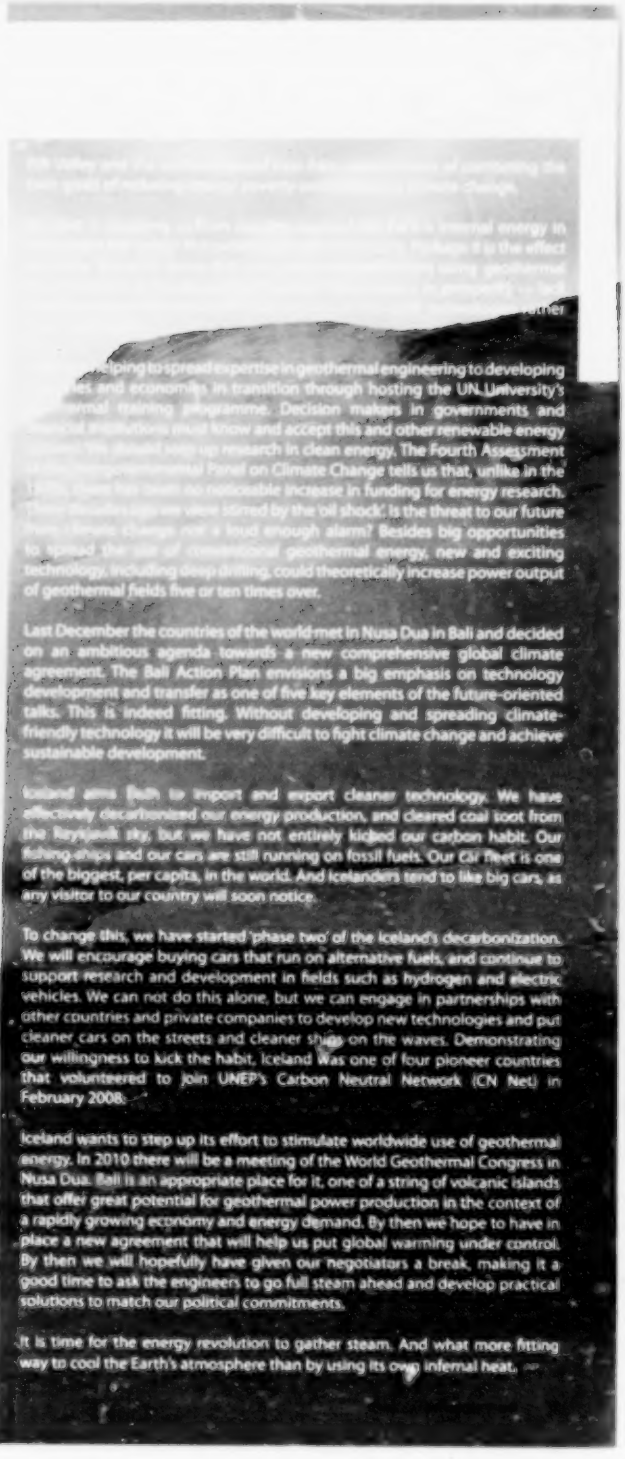
Iceland was given its chilly name by one of its first Norse settlers, who saw a fjord full of ice. By contrast, the country's first official settlement was named Reykjavík — or 'Bay of Smokes' — after the plumes of steam rising from the hot springs in the centre of the future capital. Today, Reykjavík is a warm city in a cool country, thanks to the abundant natural heat that supplies its geothermal public utility, the biggest of its kind in the world.

But it wasn't always so. As it grew in the early 20th century, Reykjavík was heated by imported coal — and a black cloud can be seen hanging over town in some photographs of the time. But why would people with piping hot water, literally underneath their feet, ship in coal from overseas for heating? The answer is simple: coal-fired generators were the ubiquitous technology of the day, and it took some time for Icelandic engineers to master the task of utilizing geothermal energy.

By the early 1970s, however, Reykjavík's heating and electricity generation were essentially decarbonized. Yet oil heating was commonplace in the countryside, as many parts of Iceland are outside the main volcanic zone, and thus considered geologically "cold". The government therefore sponsored a drive to find and utilize geothermal in these places. Partly as a result, the share of geothermal in space heating has increased from 43 per cent in 1970 to about 90 per cent today; with less than 1 per cent of households relying on fossil fuels for heating. Electricity in Iceland is also almost entirely produced by renewables: hydro and geothermal steam.

It could be said that Iceland is exceptional, with a small population sitting on top of vast renewable energy resources. Indeed, this is [illegible] place where the Earth sweats off its internal heat, and geothermal energy has huge potential worldwide.

Geothermal is now used in dozens of countries, and is seen by many of them as a relatively cheap and reliable source of electricity (and heating, in cooler areas). Current geothermal energy production places it third among renewables, after hydro and biomass, and ahead of solar and wind. Yet its present level of use is tiny compared to its potential. Geothermal is no less abundant in developing countries in such areas as Central America, the African



...lping to spread expertise in geothermal engineering to developing ...es and economies in transition through hosting the UN University's ...rmal training programme. Decision makers in governments and ...l institutions must know and accept this and other renewable energy ... research in clean energy. The Fourth Assessment ... Panel on Climate Change tells us that, unlike in the ... seen no noticeable increase in funding for energy research. ... were stirred by the 'oil shock' is the threat to our future ... change not a loud enough alarm? Besides big opportunities ... of conventional geothermal energy, new and exciting technology, including deep drilling, could theoretically increase power output of geothermal fields five or ten times over.

Last December the countries of the world met in Nusa Dua in Bali and decided on an ambitious agenda towards a new comprehensive global climate agreement. The Bali Action Plan envisions a big emphasis on technology development and transfer as one of five key elements of the future-oriented talks. This is indeed fitting. Without developing and spreading climate-friendly technology it will be very difficult to fight climate change and achieve sustainable development.

Iceland aims high to import and export cleaner technology. We have effectively decarbonized our energy production, and cleared coal soot from the Reykjavik sky, but we have not entirely kicked our carbon habit. Our fishing ships and our cars are still running on fossil fuels. Our car fleet is one of the biggest, per capita, in the world. And Icelanders tend to like big cars, as any visitor to our country will soon notice.

To change this, we have started 'phase two' of the Iceland's decarbonization. We will encourage buying cars that run on alternative fuels, and continue to support research and development in fields such as hydrogen and electric vehicles. We can not do this alone, but we can engage in partnerships with other countries and private companies to develop new technologies and put cleaner cars on the streets and cleaner ships on the waves. Demonstrating our willingness to kick the habit, Iceland was one of four pioneer countries that volunteered to join UNEP's Carbon Neutral Network (CN Net) in February 2008.

Iceland wants to step up its effort to stimulate worldwide use of geothermal energy. In 2010 there will be a meeting of the World Geothermal Congress in Nusa Dua. Bali is an appropriate place for it, one of a string of volcanic islands that offer great potential for geothermal power production in the context of a rapidly growing economy and energy demand. By then we hope to have in place a new agreement that will help us put global warming under control. By then we will hopefully have given our negotiators a break, making it a good time to ask the engineers to go full steam ahead and develop practical solutions to match our political commitments.

It is time for the energy revolution to gather steam. And what more fitting way to cool the Earth's atmosphere than by using its own infernal heat.

salvaging

g the biosphere

by Tewolde Berhan Gebre Egziabher

mission zero

by Ray C. Anderson

"If it exists, it must be possible," asserts Amory Lovins, co-founder and chief scientist of the Rocky Mountain Institute think tank. He is talking about my company. Fellow industrialists, I dare say, thought my ambition impossible to realize when fourteen years ago I [illegible] my aspirations for Interface Inc. to turn into what it actually is becoming today. Indeed, around then, the CEO of a major competitor looked me in the eye and said, "Ray, you're a dreamer." Yet, as Amory says, "If it exists..."

The "impossible" that exists today is a petroleum-intensive carpet manufacturer (for both energy and raw material) that has reduced net greenhouse gas (GHG) emissions by 88 per cent, in absolute tons, and its water usage by 79 per cent since 1996, even as sales have grown by two-thirds and earnings have doubled. In 1994 Interface set out on a mission "to be the first industrial company that, by its deeds, shows the entire industrial world what sustainability is, in all its dimensions: people, process, product, profit, and place." Our definition of sustainability is to operate not [illegible] company as to take from the Earth only that which is naturally and rapidly renewable and to do no harm to the biosphere.

By the end of 2006, the company I founded in 1973 to produce carpet tiles in America — now a billion US dollar (US) global enterprise with operations on four continents and sales in 110 countries — had reduced its overall impact on the environment by nearly 50 per cent (including the GHG and water use reductions cited above).

The amount of our energy derived from fossil fuels has been cut by 55 per cent. All the electricity for six of our eleven factories now comes from renewable sources (solar, wind, geothermal, and biomass), as does 17 per cent of our total energy usage. The goal is 100 per cent by 2020. Forty-seven per cent of our smoke stacks and 81 per cent of our effluent pipes have been abandoned, obviated by process changes. 127 million pounds of used products are collected at the end of their lives to be recycled into new carpet. Twenty-six per cent of our raw materials are derived from renewable sources, recycled or bio-based materials: the goal, again, is 100 per cent by 2020.

Cumulatively, we have avoided $372 million in costs by eliminating waste, in a quest that is half way to achieving waste-free perfection by 2020. We define waste as any cost that does not add value for our customers. This translates ambitiously into doing everything right the first time, every time. We even define energy that still comes from fossil fuels as waste, something to be eliminated. Indeed, while offsets have a critical role to play in helping Interface (and, indeed, all of us) to reach our sustainability goals, we will not achieve them until we begin to redefine fossil fuel energy in this way. Sounds incredible? Remember, "If it exists..."

So how did this come to exist? In 1994, Interface was 21 years old, and successful by anyone's definition. We kept our eye on the bottom line — the financial bottom line — and didn't notice or care that the company consumed enough energy each year to light and heat a city. Or that we and our supply chain

Moreover, Interface products are widely recognized in a competitive industry as cutting edge, aesthetically as well as environmentally. Sustainable design, and especially biomimicry (or design inspired by nature) — has produced a wellspring of innovation, and opened the door to markets never imagined 15 years ago. Interface designers routinely ask themselves such esoteric questions as: How would nature design a floor covering? Or how does a spider go about designing a ceiling? Some of the most strikingly successful products in the industry's history have come from the answers.

The people of Interface are galvanized around the shared higher purpose of sustainability. Better people are applying the best are staying and working with purpose. In my 32 years in business, I have never seen anything equal sustainability for attracting, motivating, and bringing people together. And the goodwill of the marketplace is astounding. No amount of advertising or marketing expenditures could have generated as much, or meant as much to sales and the bottom line, impossible as this might have seemed in 1994.

Amazingly this initiative has produced a better business model, a better way to bigger and more sustainable profits. It out-competes its competitors in the rough and tumble of the marketplace, but not at the expense of the Earth or future generations. Instead it includes Earth and generations not yet born in win-win-win relationships. As validation of this, the Interface share price has moved from $2 to $20 in four years, as we have dug out of the deepest, longest recession in our industry's history, a recession we might not have survived without the enormous boost of sustainability.

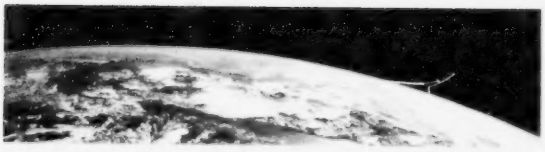
But, what about the big picture? What does the Interface journey have to teach us? A sustainable society into the indefinite future depends totally and absolutely on a vast, ethically driven redesign of the industrial system, triggered by an equally vast mind-shift — one mind at a time, one organization at a time, one technology at a time, one building, one company, one university curriculum, one community, one region, one industry at a time — until the entire system has been transformed into a sustainable one existing ethically in balance with Earth's natural systems, upon which every living thing, even civilization itself, utterly depends.

One person, you, can make the difference in your organization. The key is:
Do something, then do something else. ∞

awards and events

WWW

Kicking the Carbon Habit: Useful Links



drive time

inventing the future

by Vinod Khosla

"Some people see things as they are and say why? I dream things that never were and say why not." Robert Kennedy said something like this more than 40 years ago, and it's even more applicable today. We have all seen the forecasts on why the world won't change — how we're doomed to our fate, chained to a future where oil remains the dominant commodity, unshakeable, and impossible to replace. The mistakes of the past persist — extrapolating historical data while ignoring deviations from the norm, and failing fully to understand the shock potential of technology. That is the world of economists and econometrics. I live in the world of innovation and innovators — one driven by the power of ideas fuelled by entrepreneurial energy.

Cellulosic biofuels have seen an explosion of interest in the last few years as we start to come to grips with the climate change problem. Meeting the needs of this challenge requires an unprecedented coordination of capital, intellect, and pragmatism. Yet we remain confident that we will succeed — foreseeing $1.99 a gallon cellulosic ethanol at neighbourhood service stations within 5 to 10 years, with 75 per cent reductions in carbon emissions, water use and land use.

The world of fuel chemistry and production is undergoing exciting cha
The broad range of possible biofuels include butanol, cellulos
cellulosic biodiesel, cellulosic 'biocrude', and many more. The
customized chemistries means that we can remove a hyd
add a hydrogen there, and create a longer or shorter
the fuel for the intended purpose.

Somecommonchemicalandbiologicalpathways
for decades to make biofuels' such as fermenting
Others are newer and innovative. Most exciting is how these ideas
to be the target of companies, varying from small, privately funded
to such behemoths as BP. This is the power of the innovation
researchers and innovators from very disparate fields come to gether to prove
out new approaches. This is why traditional 'energy research' organizations
and companies are unable to make sufficient
breakthroughs will come from the innovation ecosystem. It is the reason why
traditional 'pundit's forecasts' lag far behind the reality of small entrepreneurial
companies. It is why General Motors just announced a partnership with
Coskata to produce $1.00 per gallon cellulosic ethanol made from waste and
Range Fuels of Broomfield, Colorado, announced similar cost points using
wood waste — both by 2010!

There are many examples of these innovative companies. LS9, in San Carlos, California, is using synthetic biology to move pathways from plants into bacterial cells to try to make petroleum from fermenting cellulosic feedstocks. Amyris, a company funded by $40 million from the Gates Foundation to develop the anti-malarial drug artemisinin, is transforming itself into a next generation biofuels company using the same technology platform. Gevo, a company formed in response to "you can't do that with synthetic biology yet" is taking on BP-Dupont in the race to commercialize butanol.
Range Fuels has developed an anaerobic gasification process to convert biomass into ethanol. Elsewhere, researchers looked at its synthesis gas production process and speculated that they could improve it by using bugs that convert syngas to ethanol. Coskata was born as a science experiment with a license to the technology from the University of Oklahoma, a few million in seed funding and a few great researchers. Lanza believes they can produce 50 billion gallons of ethanol from steel mill exhaust, while Mascoma is innovating the traditional biochemical pathway to produce it at dramatically lower costs. Kior is bypassing ethanol and producing a biocrude appropriate for feeding directly into refineries. The ideas and innovations don't stop!

"While the technology may work", critics say, "land use and feedstock needs render it impractical as a large scale solution." Once again, we disagree. We believe that the United States, the world's most prodigious consumer of oil, can meet all its light vehicle fuel needs by 2030 with relatively limited additional land. We consider four principal sources of biomass:

- energy crops on agricultural land and timberlands using crop rotation schemes that improve tra
- winter cover crops grown on current annual crop lands during the winter season when they are generally dormant (while improving land ecology);
- currently unused excess forest product (about 225 million tons according to the US Department of Energy); and
- organic municipal waste, industrial waste and municipal sewage.

Take one scenario
of annual crop land
by 2030, we
land (while

energy crops, which need less replanting and help restore soils
agronomic practices such as no-till farming and non-irrigated crops

One understated benefit is the potential for biofuels to help places like Africa. In the future world of cellulosic ethanol, the $300 billion the US spends on oil purchases and the EU's $136 billion spending on oil imports could be allocated to Africa, with its vast potential for biomass cultivation. This would also help developing economies in China, India and Latin America by reducing the price of energy, and may be the single most important poverty alleviation tool we have. A focus on biomass will generate new income for Africa, India and Latin America's rural poor as well as America's rural population. America, with its agricultural advantages, will almost certainly produce all its own fuel. But Latin America and Africa might supply Europe, China and India, resulting in a new, more distributed and diverse geopolitical balance of energy and incomes.

Are we being too optimistic and overstating the rate of change? On the contrary, I believe we are understating the potential impact. Critics argue from the "what is" as opposed to "what can be" approach. Their argument is circular: "if it isn't true today, it won't be true tomorrow and hence is not worth working on". We disagree, primarily because we are technology optimists.

We have seen exactly the same happening in the past. In 1982, when we started Sun Microsystems, we were told that competing against IBM and Burroughs was inconceivable. In a 1996 meeting with the heads of media giants like the Washington Post, Knight-Ridder, Tribune, Cox, and the New York Times, I attempted to explain how the internet would disrupt their business: now Google is worth more than all of them combined. Just a few years ago, every major telecommunications carrier noted that they would never adopt Internet protocols: today, venerable AT&T has been sold for a song because they failed to heed the innovation the internet offered.

The point is to highlight how fast change happens — driven by the power of technology. Alan Kay said it well: "the best way to predict the future is to invent it." This is clearly starting to come about.

green sky thinking

by Rob Fyfe

Perception of the environmental issues around air travel may cloud the reality of the size of the industry's contribution to global warming, but it is clear that airlines now face a real challenge in developing publicly acceptable environmental performance.

Less than three per cent of global carbon dioxide emissions currently come from aircraft and, although air travel is destined to increase over the next two decades, aviation will continue to remain only a small part of the big problem of climate change.

Air New Zealand is a small airline from a small country but the company sees the challenge of climate change as an opportunity.

As a country, New Zealand is committed to global leadership in environmental issues. We have a government pledged to environmental sustainability and an image as a clean, green country to protect, both for the health of the planet and for economic necessity, as New Zealand's economy relies heavily on tourism.

As part of this commitment, Air New Zealand would like to become the world's most environmentally aware airline by incorporating environmental standards, products and practices into all areas of the business over the next few years.

Credibility needs to be an integral part of any company's environmental programme, as consumers have already become attuned to 'greenwash'. It is essential that environmental programmes operate not only at the airline's external face but throughout the company, with the engagement and involvement of employees.

Publicly, however, the most important aspect to be addressed is that the fossil fuel used to power planes contributes toward global warming. Although there is some emphasis on the potential ability of new aircraft design and technology to assist with the amount of fuel use, a major one is on finding alternative fuels.

The recent flight by Virgin Airways using 20 per cent biofuel made from coconut oil and babassu, caused controversy among some environmental groups, who claimed it was a gimmick. This detracted from the positive outcome of the flight, which highlighted that new fuels are on the horizon and will probably be available within the next five to 10 years.

Last year, Air New Zealand announced that we would undertake a test flight using a sustainable biofuel, and it will take place later in 2008. The growing awareness of the potential downsides of biofuel, such as the use of arable land to grow crops for it, is an issue — but the feed stocks being considered by Air New Zealand for the biofuel trial will overcome this. Two possible sources are under consideration: jatropha which grows on marginal land which cannot easily be used for other crops, and algae which grows on sewage ponds or in seawater.

Access to the required amount of suitable biofuel to conduct the trial will guide the timing of the flight, but it is planned to use it in one engine of a Boeing 747 on a test flight out over the Tasman Sea between Australia and New Zealand.

Unfortunately, there is no magic bullet that will be able to solve the biofuel challenge. Yet there is no doubt that algae does have advantages over other feed stocks as it can grow in waste water and only requires sunlight and carbon dioxide. It is also endlessly renewable.

The ultimate aim is to find a commercially viable alternative fuel for the airline from a New Zealand-based source, so algae will likely have the most potential.

Air New Zealand is keen to encourage research into alternative fuels and wants to work hand in hand with industry partners and the New Zealand Government in promoting this type of activity.

Alongside the biofuel initiative, we have already made significant steps toward the goal of becoming the world's most environmentally responsible airline through investing in new fleet. The Boeing 787 Dreamliner, due to come into Air New Zealand service in 2010, will save 20 per cent more fuel than similar aircraft, through a combination of new technology and weight reduction.

Together with the Boeing 777s currently flown by the airline, this will mean that Air New Zealand has one of the youngest, most technologically advanced, fuel efficient and environmentally friendly long haul fleets in the world.

Within the company, we are working toward establishing an environmental management system with the target of attaining ISO14001 by 2010. Already projects are underway in waste management and energy auditing, along with regular compliance programmes.

Staff have been given the opportunity to think more about how they can be environmentally aware in their own lives, the community and at work by joining our Green Team. Nearly 20 per cent of Air New Zealand staff have already joined the team, which has champions across the business helping to get staff involved in environmental activities.

Other initiatives such as general fuel saving, weight reduction and flying techniques go a long way to already positioning the airline at the forefront of environmental responsibility.

living simply

by Meenakshi Raman

Responses to the international climate change crisis — caused by unsustainable over-consumption of fossil fuels, particularly in the North — are at present gravely inadequate. If this is indeed the defining issue of this century, then nothing short of fundamental change is needed.

Poor, vulnerable communities in developing countries — the least responsible for climate change — are being hit the hardest by its impacts and by the false solutions being promoted to tackle it. This is an issue of development, human rights and justice. Those countries with the greatest responsibility for historical and continuing greenhouse gas emissions have sufficient wealth to act and must do so. The inequitable consumption of resources by the North, and its exploitation of resources from the South, have led to ecological debt that must be repaid.

Science tells that, if the most dangerous impacts are to be avoided, average global temperature increase must be kept well below two degrees centigrade above pre-industrial levels. This implies that the long term concentration of greenhouse gas emissions cannot exceed 450 parts per million carbon dioxide equivalent — though, even at this level, there will be countries, communities and species that will suffer catastrophic effects.

The science also suggests that global greenhouse gas output needs to be at least halved by the middle of the century, compared with 1990 levels. Science does not tell us that there has to be agreement on the principles of 'burden sharing' between the North and South. The deeper the cuts to be made by developed countries, the less the burden on developing ones.

It is clearly insufficient, for example, for the developed nations to reduce their emissions by between 60 and 80 per cent as part of a global 50 per cent cut by 2050. Let us look, as the Third World Network has done, what that would mean in practice for the South. In 1990 the world produced 18.6 billion tonnes of carbon dioxide; cutting this by half would bring it down to 19.3 billion. The North's original share of this was just under half at 18.4 billion tonnes, and a 70 per cent cut would reduce it to 5.5 billion. That would leave the developing countries with a target of 13.8 billion, 33 per cent down on their 1990 level of 20.4 billion tonnes. But since their population is due to more than double over that period their per capita emissions would have to be cut by 65 per cent.

There should be open debate as to whether such a cut is fair and whether it should be undertaken. Given the North's historical responsibility — and the quality of life it has attained at the expense of the atmosphere and the South's environmental space — it is indeed its responsibility to address the implications of what appears to be an unfair burden on developing countries.

The heart of the matter is whether and how we can find a sustainable development pathway for developing countries that leads not only to stabilized greenhouse gas emissions but to improving living standards and alleviating poverty within an ecological framework — and enables new policies for agriculture, industry, trade and finance.

This is an enormous development challenge and one that should not be underestimated by predictions that spending between 1 and 2 per cent of GNP would be enough to take care of the problem. Much more work and action is needed to show how developing countries can go into a simultaneously low carbon and sustainable development pathway.

The following measures are necessary elements for such a way forward.

Developed countries must urgently undertake a major leap in dramatically cutting their emissions, so as to give much of the developing world the environmental space to undertake sustainable development to address the basic needs of their people and overcome poverty. Thus, the burden-sharing arrangement must be frontally addressed.

Lifestyle changes are needed especially in the North and among the elite of the South. Not enough attention is being given to this fundamental issue, though the outcomes of the 1992 Rio Earth Summit emphasized changes in consumption patterns and production systems. We cannot afford to maintain the position that the lifestyles of the rich are not up for negotiation when so much is at stake. Even the Intergovernmental Panel on Climate Change's Fourth Assessment Report states that changes in lifestyle and behaviour patterns can reduce greenhouse gas emissions. The changes must emphasize resource conservation and contribute to a low carbon economy that is both equitable and sustainable. We have to live simply so others can simply live.

The developing countries must be rapidly enabled and supported with the finance and technology needed to undertake a low carbon pathway. There must be a massive increase in public funds and resources from the North to the South — rather than as is currently advocated, more reliance on the private sector and the carbon markets for the additional finance needed to meet the costs of mitigation, adaptation and reconstruction. Revenue for these funds can be raised by redirecting military spending, cancelling debts, contributing cap and auction winnings, and raising levies and taxes.

Barriers, such as intellectual property rules, to transferring and deploying climate-friendly technologies to the developing world must be removed or relaxed. Technological options being discussed by some, such as nuclear energy, genetically modified trees (to allegedly improving sinks), agrofuels, large hydropower plants and carbon capture and storage, are false solutions as they pose grave risks to the environment and health and safety, and threaten a variety of social impacts.

More emphasis and priority should be given to energy efficiency and renewable energy, especially solar and wind power. Decentralized forms of energy production, as the hands especially of the rural poor in developing countries, are a major imperative.

Adaptation efforts should benefit the poor and protect ecosystems, livelihoods and human security. Community-based projects provide the best opportunity to ensure that these are cultural*, technically and socially appropriate and increase resilience to the impacts of climate change.

Forest protection programmes must uphold community rights and the land rights of indigenous and other local peoples, prohibiting any action that seeks to exclude subsistence and forest-dependent communities from conservation areas. Failure to prohibit this is an endorsement of environmental racism and threatens sophisticated cultural conservation practices.

Crucially, there must be coherence, from a climate perspective, in the policies of the World Trade Organization (WTO), the International Monetary Fund and the World Bank. Some of their policies have promoted climate vulnerability and undermined resilience in developing countries. More anti-poor policies that undermine sustainable development are being pursued through international financial institutions with aid conditionalities, through the WTO and through Free Trade Agreements designed to open up developing country economies.

How can developing countries give priority to integrating climate change into national policies when international measures exacerbate poverty and inequity, including through displacing small farms and firms and giving access over natural resources to powerful foreign corporations? This must be reversed, in a process that will also require coherence in developed country policies.

As grassroots based NGOs in developing countries, we will continue to do all we can to enhance their commitment to give top priority to climate change. But this cannot materialize unless international policies complement national efforts. If all the above issues are addressed well, more sympathetic policies and behaviour can be expected from the South. ●

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Love and ecology

KT Tunstall

Rock star KT Tunstall has achieved the rare feat of getting the message on kicking the carbon habit into lurid tabloid newspapers. She told a reporter how she avoided using air conditioning in the summer by "walking around my house naked." And she added: "I also highly recommend sharing a bath, hitting yourself on the head with a ladle if you need to boil the kettle twice, and turning your heating down by two degrees."

The 32 year old singer _ who has sold five million records, won three BRIT awards, and received a Grammy nomination _ has taken steps to reduce her own carbon footprint, and is reaching a wide audience with her forthright, if quirky, advice.

Born to Chinese and Irish parents, she was adopted at two weeks by a physicist and a schoolteacher in the Scottish university town of St. Andrews." I grew up on a craggy coastline that is crumbling into the wild North Sea," she says. "To me, nature is an obviously omnipotent force, and we are guests. As long as we are graceful, appreciative lodgers, the earth remains healthy and wondrous. But we are trashing the guest house, and it feels wrong."

Tunstall did not even start listening to pop music until she was 17. Her home had no television or stereo because her younger brother is profoundly deaf, and the noise interfered with his hearing aid. But she taught herself the guitar from a busker's booklet, and formed her first band while on a scholarship in Connecticut, USA. She returned to Britain, took the name KT ("I needed to do something with my name to stick out of the crowd") and performed frequently. But success was a long time coming; she finally broke through as a last minute stand-in on a television show, giving a barnstorming rendition of her single 'Black Horse and the Cherry Tree', which then shot to the top of the charts.

She is now intent on using her fame to tackle climate change. "I'm not out to preach", she says "but global warming is the most important issue in our lives. Even small changes can make a difference. But if we don't all change our attitudes — and make wider choices — we'll be living in a very different reality in ten year's time. It won't be nice."

She has set about making such choices in what she admits is "the pretty environmentally unfriendly job" of a rock star. She does not own a car, insists that her tour buses run on biodiesel, adds a small charge to each ticket so that she can offset fans' trips to see her, and has planted a wood of 5,000 trees.

She has greened her London flat — insulating it with 95 per cent recycled board and sheep's wool; adding eleven solar panels; fitting water saving devices and using solvent-free paint; and sticking to wood that has either been reclaimed or certified by the Forest Stewardship Council.

And she continues to urge practical measures, in her own style. "Go topical not tropical: these days everyone's turning their thermostat down a degree or two." "Tell everyone in the family to have a shower, not a bath: that will stop them singing." And: "Forgotten what those funny things on the end of your legs are for? Find out. Walk." GL

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